

FUNCTIONAL CHANGES OF KIDNEYS IN PATIENTS WITH PNEUMONIA***Muminov Davron Kadirovich**

Assistant of the Department Internal Diseases, Tashkent Pediatric Medical Institute. Address: Bagishamal str., 223. Yunusabad Region, 100140, Tashkent. Uzbekistan.

***Corresponding Author: Prof. Muminov Davron Kadirovich**

Assistant of the Department Internal Diseases, Tashkent Pediatric Medical Institute. Address: Bagishamal str., 223. Yunusabad Region, 100140, Tashkent. Uzbekistan.

Article Received on 17/12/2019

Article Revised on 07/01/2020

Article Accepted on 27/01/2020

ABSTRACT

The aim of the study: Assess the functional state of the kidneys in patients with pneumonia, depending on the premorbid background (the presence of CKD). **Material and methods:** 120 patients with pneumonia (Pn) were examined, of which 80 patients developed the disease against the background of chronic kidney disease (Pn+ CKD group). A comparative study of the functional state of the kidneys in the groups Pn and Pn + CKD was carried out. AKI was diagnosed in 68 patients of the PN group + CKD (85%) and in 23 patients of the PN group (57.5%). It is also proven that in patients with pneumonia, creatinine concentration gradually increases, and the peak load is 3-4 days, and then decreases. **Conclusion:** Changes in renal function indicators are less favorable for patients with background CKD.

KEYWORDS: Pneumonia, chronic kidney disease, acute renal damage.

INTRODUCTION

Community-acquired pneumonia (Pn) is one of the most common causes of hospitalization. According to epidemiological analysis, pneumonia continues to occupy first place among infectious causes of death, steadily occupying a leading position for more than 30 years.^[1,6] Pneumonia often leads to kidney damage, which often determines the course and prognosis of the underlying disease.^[7] In a study by Raghavan (2007) in 34% of patients, pneumonia was complicated by acute damage to the kidneys (AKI) of various degrees, while in 2/3 of them the criteria for AKI were found already at the time of hospitalization. The development of AKI in patients with Pn was associated with an increased risk of nosocomial, 90-day, and annual mortality. Moreover, the risk of mortality did not decrease even after the relief of complications of pneumonia and discharge of patients (on average on the 8th day of hospitalization). Even a moderate decrease in renal function was associated with an increased risk of mortality.^[3,4] In patients with Pn, the diagnosis of AKI may be difficult due to the lack of information on the premorbid level of blood creatinine, although some studies provide data on the correlation of AKP and premorbid glomerular filtration rate (GFR) and a greater risk of AKI in patients with underlying chronic kidney disease (CKD)) In contrast, even a short episode of AKI in terms of long-term prognosis is associated with an increased risk of developing CKD.^[2,5,6]

The aim of the study: Assess the functional state of the kidneys in patients with pneumonia, depending on the premorbid background (the presence of CKD).

MATERIAL AND RESEARCH METHODS

The study included 120 patients with pneumonia. The average age of patients was 48.46 ± 3.78 years. 40 patients did not have a history of renal pathology (Mon group), 80 patients suffered from chronic kidney disease (GFR for 3 months before the development of pneumonia 30-60ml / min / 1.7m², Pn group + CKD). As a control group (CG), 20 healthy individuals with no signs (including anamnestic) of chronic renal pathology and respiratory pathology were examined. In the Pn + CKD group, the distribution of patients according to the etiology of CKD was as follows: chronic glomerulonephritis 64 patients (80%), chronic pyelonephritis 4 patients (5%), gouty nephropathy - 7 patients (8.75%), etiology not found - 5 patients (6,25%). Patients with background diabetes mellitus, diffuse diseases of the connective tissue, malignant neoplasms were not included in the study. Upon admission, all patients underwent a complete clinical diagnostic examination.

Verification of the diagnosis was carried out on the basis of chest x-ray. Creatinine concentration was determined by the Jaffe method, then using CKD-EPI formulas in the 2011 modification (on-line calculator on the site <http://nefrosovnet.ru/>), rSCFcr was calculated. The concentration of cystatin C was determined by enzyme-linked immunosorbent assay ELISA with the calculation of rSCFcis = $90.63 \times \text{cystatin C} - 1.192$ (Hojs R et al. Clin Nephrol. 2008; 70 (1): 10-7.). AKI was diagnosed with an increase in blood creatinine concentration on the 3rd day by 0.3 mg / dl.

During statistical processing, the arithmetic mean and its standard deviation were calculated. The reliability of the intergroup differences was evaluated in the case of parametric values using the Student criterion, and in the case of a frequency analysis, the occurrence of signs was used using the tabular chi square criterion.

RESEARCH RESULTS AND DISCUSSION

In order to diagnose AKI in patients with Mon. in this study, we determined the serum concentration of creatinine and cystatin C blood at admission and subsequently the concentration of blood creatinine was determined daily. Initially, the blood creatinine concentration in patients with Pn significantly exceeded the value characteristic of CG ($p < 0.001$, Table 1), however, the isolation of patients with background chronic renal pathology (Pn + CKD group) showed that in patients without previous renal damage at the time of admission the concentration of blood creatinine was

comparable to that characteristic of healthy individuals, which suggests the preservation of renal function in this group of patients.

An analysis of the serum concentration of cystatin C shows a different picture: its concentration in patients with Pn exceeded the concentration in CG both in patients with Pn + CKD ($p < 0.001$) and in patients with Pn ($p < 0.001$). Cystatin C is synthesized by all nucleated cells at a constant rate, has 100% clearance. Since the concentration of Cys C in serum (sCysC) and urine (uCysC) does not depend on the patient's age, gender, diet, hydration, muscle mass and metabolic characteristics, the state of renal concentration function can be more accurately compared to creatinine determination.^[9] Thus, from the first day in patients with Pn, a violation of the functional state of the kidneys is noted.

Table 1: The functional state of the kidneys in patients with Pn on the first day of hospitalization.

Indicators	All patients with Pn (n=120)	Pn+CKD (n=80)	Pn (n=40)	CG (n=20)
Creatinine $\mu\text{mol} / \text{l}$	133,40 \pm 92,38***	196,43 \pm 74,73***	50,85 \pm 15,46^^^	46,40 \pm 10,96
Cystatin $\mu\text{mol} / \text{l}$	1,83 \pm 0,95***	2,32 \pm 0,75***	0,85 \pm 0,37***^^^	0,50 \pm 0,12

Note: * - significance of differences with CG, ^ - significance of differences with group Pn. One character - $p < 0.05$, two characters - $p < 0.01$, three characters - $p < 0.001$.

In the present study, AKI was diagnosed in 91 patients, which amounted to 75.8% of the total number of patients (Table 2). In the Pn + CKD group, acute kidney damage

was observed in 68 patients of the group (85%) and in the Pn group in 23 (57.5%) chi square = 10.80, $p < 0.01$.

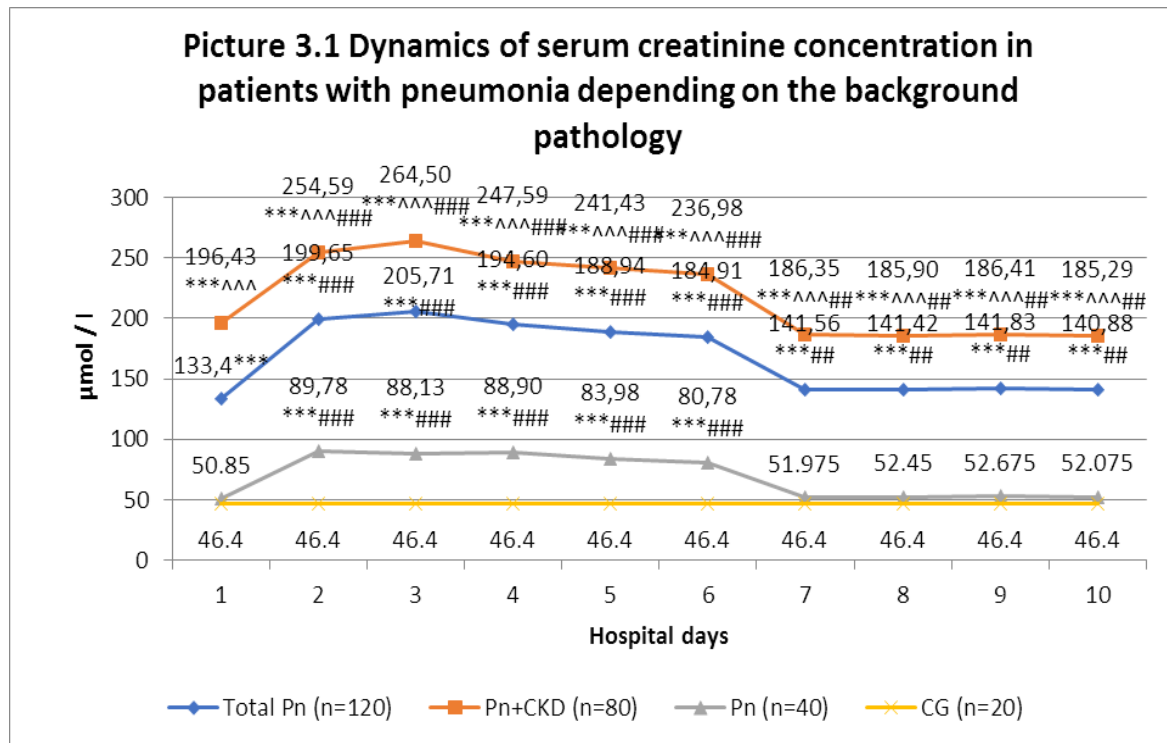
Table 2: The frequency of AKI in patients with Pn, depending on the background renal pathology and therapy.

	AKI	X ²
All Pn (n=120)	91 (75,8%)	
Pn+CKD (n=80)	68 (85%)	10,80, $p < 0,01$.
Pn (n=40)	23 (57,5%)	

An analysis of the dynamics of creatinine concentration in peripheral blood revealed an increase in creatinine level in both examined groups, by the maximum of 3 days of hospitalization, followed by a gradual decrease, while in the Mon group by the 7th day, serum creatinine concentration returned to its original values and became comparable with the concentration creatinine in the CG, and in the Pn + CKD group, it remained significantly higher than the initial values (Fig. 1).

decreases. Changes in renal function indicators are less favorable in patients with background CKD.

Thus, the study showed that in all patients with pneumonia on the first day of the disease there is a violation of the structural and functional state of the kidneys, consisting in an increase in serum creatinine and cystatin C. Acute kidney damage was observed in 68 (85%) pneumonia patients without premorbid pathology kidney and in 23 (57.5%) patients with pneumonia on the background of CKD. The dynamics in patients with pneumonia was observed gradual an increase in creatinine concentration, a peak at 3-4 days, the formation of a "plateau" up to 6 days and then it



Note: * - significance of differences with CG, ^ - significance of differences with the group of Pn, # - significance of differences with the source data. One character - $p < 0.05$, two characters - $p < 0.01$, three characters - $p < 0.001$.

REFERENCES

- Kruglyakova L.V., Naryshkina S.V., Odireev A.N. Modern aspects of community-acquired pneumonia. // Bulletin of physiology and respiratory pathology, 2019; 71: S. 120-134. 36.
- Acute renal damage and severe pneumonia: the modern paradigm and clinical realities. / Semidotskaya Zh.D., Chernyakova IA, Klapoukh V.A. et al. // Medicine of emergency conditions, 2017; 4(83): S. 45-52.
- The prognostic value of acute kidney damage in patients with community-acquired pneumonia./ Serov V.A., Shutov A.M., Kuzovenkova M.Yu., et al. // Therapeutic archive, 2016; 88(6): S. 9-13.
- Bagshaw SM, Uchino S, Cruz D, et al. A comparison of observed versus estimated baseline creatinine for determination of RIFLE class in patients with acute kidney injury. Nephrol Dial Transplant, 2009; 24: 2739-2744.
- Bihorac A, Yavas S, Subbiah S, et al. Long-term risk of mortality and acute kidney injury during hospitalization after major surgery. Ann Surg, 2009; 249: 851-858.
- Hansen V, Oren E, Dennis LK, Brown HE. Infectious Disease Mortality Trends in the United States, 1980-2014. JAMA, 2016; 316: 2149-2151.
- Community acquired pneumonia guidelines//Infectious Disease Advisor.-January 08, 2018.
- Zhang Q1,2, Ju Y1, Ma Y1, Wang T3. N-acetylcysteine improves oxidative stress and inflammatory response in patients with community acquired pneumonia: A randomized controlled trial.// Medicine (Baltimore), 2018 Nov; 97(45): e13087.
- Park M.Y., Choi S.J., Kim J.K., Hwang S.D., Lee Y.W. Urinary cystatin C levels as a diagnostic and prognostic biomarker in patients with acute kidney injury. Nephrology (Carlton), 2013; 18(4): 256-62.